A container comprises a first cover and a second cover, in which the first cover comprises an internal space. The container further comprises a plate disposed on the second cover. The second cover is provided with at least one first foolproof device, while the plate is provided with at least one second foolproof device. When the second foolproof device is engaged with the first foolproof device, the plate and the second cover are generally fixedly positioned with respect to each other.
CONTAINER AND FOOLPROOF DEVICE THEREOF

BACKGROUND OF THE INVENTION

1. Technical Field

The present invention relates to a container and, more particularly, to a foolproof device of a container for preventing components of the container from being mispositioned.

2. Description of Related Art

Semiconductor technologies have developed rapidly in the past few decades, wherein optical lithography plays a critical role. Optical lithography is necessary wherever a pattern needs to be defined. When optical lithography is applied to semiconductors, a designed pattern is first made into a light-transmitting reticle having a particular shape. Then, a light source is projected through the reticle onto a silicon wafer to reveal a particular pattern by exposure. A reticle for generating a pattern must be absolutely clean because any dust particles attached to the reticle (such as tiny particles, powdery dusts or organic matters) will damage the quality of imaging through projection. Therefore, a clean room is always provided for general wafer processes to prevent particles from polluting the wafer. However, present clean rooms cannot achieve an absolutely dust-free standard. Anti-contamination reticle pods are hence used in modern semiconductor processes for storing and transporting reticles in order to maintain the reticles particle-free.

A conventional reticle pod is usually made of a macromolecular material. This kind of material provides such advantages as molding easily, low cost, and transparent. While this kind of material has a high electrical resistance and is therefore nonconductive, it tends to generate static electricity from friction or general handling. Particularly the humidity in a clean room must be kept at a low level, electric charges can be very easily generated and accumulated on a reticle made of such material. Electrostatic charges on a surface of a reticle will attract particulate pollutants in the air or even result in an electrostatic discharge (ESD) from metal liner on the reticle. Once the static electricity is discharged, a transient current is generated and would produce sparks or arcs. A strong current and a high temperature accompanying the sparks or arcs will eventually oxidize and melt the metal liner, thereby changing the pattern on the reticle.

Presently there are many solutions to the problems associated with electrostatic discharge. First of all is to improve the working environment by maintaining an appropriate humidity in the air, equipping operators with clothes having a grounding effect, or using ion fans to remove static electricity in the environment. However, the working environment may be changed by a plurality of unpredictable factors, so that it is impossible to completely prevent a reticle from being damaged by static electricity.

Another approach is to change the material of which the reticle pod is made. For example, U.S. Pat. No. 6,513,654 provides a reticle support structure having a grounding function, wherein the reticle support structure can discharge electrostatic charges on the reticle when the reticle pod is in contact with a matching table. As another example, U.S. Pat. No. 6,247,599 provides a reticle pod wherein the conductive plate, the metal liner or the handle of the reticle pod is equipped with an electrically conductive plate to prevent the accumulation of electric charges. While the method of adding an electrically conductive plate has been widely adopted, the metal liner and the plate are positioned mainly by screws, which becomes a contamination source during a screwing process because a friction in the screwing process will generate tiny particles and thus causes contamination.

In view of the above, the present invention aims to improve the shortcomings of prior art reticle pods by providing a reticle pod disclosed herein.

SUMMARY OF THE INVENTION

A primary objective of the present invention is to provide a container and a foolproof device thereof, wherein the foolproof device is designed as integrated with an original structure of the container so as to ensure that components of the container are properly positioned and will not damage an article in the container when the container is in use.

A second objective of the present invention is to provide a container and a foolproof device thereof, wherein the foolproof device is so designed that it does not need to be secured with screws, so as to prevent tiny particles from being generated and thereby the contamination is reduced.

A third objective of the present invention is to provide a container and a foolproof device thereof for preventing electric charges from accumulation and thereby protecting a reticle from being damaged by static electricity.

A fourth objective of the present invention is to provide a container and a foolproof device thereof for providing a shielding device against electric charges without having to change an original structure of the container.

To achieve these ends, the present invention provides a container comprising a first cover and a second cover, wherein the first cover comprises an internal space. The container further comprises a plate disposed on the second cover. The second cover is provided with at least one first foolproof device, while the plate is provided with at least one second foolproof device. When the second foolproof device is engaged with the first foolproof device, the plate and the second cover are generally fixedly positioned with respect to each other.

The present invention also provides a container comprising a first cover and a second cover, wherein the container further comprises a metal liner and a plate. The plate is provided with at least one third foolproof device, while the metal liner is provided with a fourth foolproof device. When the third foolproof device is engaged with the fourth foolproof device, the plate and the metal liner are generally fixedly positioned, and therefore will not move, with respect to each other, so that the plate and the metal liner form an accommodating space for receiving an article.

The present invention further provides a container comprising a first cover and a second cover forming with the first cover an internal space, wherein the container further comprises a metal liner disposed on the second cover. The second cover is provided with at least one fifth foolproof device, while the metal liner is provided with at least one sixth foolproof device. When the sixth foolproof device is matched with the fifth foolproof device, the metal liner and the second cover form a space to accommodate an article.

In summary, the present invention provides a novel design that allows components of a container to be properly positioned and yet the design itself can do without screws, so that tiny particles are prevented from being generated and the contamination can be reduced. When a metal liner of the container is made of an electrically conductive material, it can...
further protect an article in the container from being damaged by static electricity. Moreover, the present invention can be applied to the reticle pods without changing their original design.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0018] The invention as well as a preferred mode of use, further objectives and advantages thereof will best be understood by reference to the following detailed description of illustrative embodiments when read in conjunction with the accompanying drawings, wherein:

[0019] FIG. 1A is a cross-sectional assembled view of a container according to a first preferred embodiment of the present invention;
[0020] FIG. 1B is a cross-sectional exploded view of the container according to the first preferred embodiment of the present invention;
[0021] FIG. 1C is another cross-sectional assembled view of the container according to the first preferred embodiment of the present invention;
[0022] FIG. 2 is yet another cross-sectional assembled view of the container according to the first preferred embodiment of the present invention;
[0023] FIG. 3 is a perspective view of a container according to a second preferred embodiment of the present invention;
[0024] FIG. 4 is a cross-sectional assembled view of the container according to the second preferred embodiment of the present invention;
[0025] FIG. 5A is a cross-sectional assembled view of a container according to a third preferred embodiment of the present invention; and
[0026] FIG. 5B is a partial, perspective view of the container according to the third preferred embodiment of the present invention.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

[0027] While the present invention is described below as applied to a container for use in semiconductor processes, the scope of the present invention encompasses all applications where cleanliness and a sealed condition are required, such as applications in medical and therapeutic equipment, biochemical devices or optical instruments. In addition, basic components in the present invention as well as their structures and the mechanical principles involved that can be readily understood by a person of ordinary skill in the pertinent art will not be further explained herein. Moreover, the drawings referred to below are intended to demonstrate only schematically structures related to features of the present invention, and are therefore not, and unnecessary to be drawn according to actual dimensions.

[0028] According to a first preferred embodiment of the present invention, FIGS. 1A and 1B illustrate a container 100 for storing or transporting an article 10. The container 100 is a reticle pod that includes a first cover 102 and a second cover 104, wherein the first cover 102 forms an internal space 106 and the second cover 104 is used to separate the internal space 106 from outside. The second cover 104 can be integrally formed or comprise a frame 1041 and a door 1042. The second cover 104 can comprise a plate 110 on a surface thereof facing the internal space 106.

[0029] As shown in FIG. 2, the second cover 104 has three first foolproof devices 112a, 112b and 112c, while the plate 110 has three second foolproof devices 202a, 202b and 202c, corresponding to the first foolproof devices 112a, 112b and 112c, respectively. When the second foolproof devices 202a, 202b and 202c are engaged with the first foolproof devices 112a, 112b and 112c, respectively, the plate 110 and the second cover 104 are generally fixedly positioned, and therefore will not move, with respect to each other. When the second foolproof devices 202a, 202b and 202c are not engaged with the first foolproof devices 112a, 112b and 112c, respectively, the plate 110 is not properly positioned on the surface of the second cover 104, so that the plate 110 may slide or shift relative to the second cover 104 or even fall off from the container 100.

[0030] In this embodiment, the first foolproof devices 112a, 112b and 112c are protrusions while the second foolproof devices 202a, 202b and 202c are recesses corresponding to the protrusions. Alternatively, the first foolproof devices can be change to recess while the second foolproof devices are protrusions corresponding to the recesses. Since the three first foolproof devices 112a, 112b and 112c must be engaged with the three second foolproof devices 202a, 202b and 202c for the plate 110 to be tightly joined with the second cover 104, the plate 110 is disposed on the second cover 104 in a particular orientation.

[0031] Referring to FIG. 1C, the internal space 106 of the container 100 can be further provided with a metal liner 115. When at least one of the metal liner 115 and the plate 110 are made of an electrically conductive material, a shielding effect against static electricity is provided for the article 10 to prevent unnecessary charge from being generated and accumulated.

[0032] FIG. 3 illustrates a container 300 for storing or transporting an article according to a second preferred embodiment of the present invention. The container 300 is a reticle pod comprising a first cover 302 and a second cover 304, wherein the first cover 302 forms an internal space 306 and the second cover 304 is used to separate the internal space 306 from outside. The second cover 304 can be integrally formed or comprise a frame and a door. In addition, the second cover 304 can be provided with a plate 310 (not shown in FIG. 3) on a surface thereof facing the internal space 306.

[0033] As shown in FIGS. 3 and 4, the plate 310 has third foolproof devices 312a and 312b, while a metal liner 315 has edges serving as fourth foolproof devices 317a and 317b. When the metal liner 315 is disposed on the plate 310 in a particular orientation, the third foolproof devices 312a and 312b are engaged with the fourth foolproof devices 317a and 317b, so that the plate 310 and the metal liner 315 are generally fixedly positioned, and therefore will not move, with respect to each other. Thus, the plate 310 and the metal liner 315 form an accommodating space for receiving the article. When the third foolproof devices 312a and 312b are not engaged with the fourth foolproof devices 317a and 317b, the metal liner 315 and the plate 310 are not fixedly positioned with respect to each other.

[0034] In this embodiment, the third foolproof devices 312a and 312b are a sidewall protruding from a surface of the plate 310 facing the internal space 306, while the fourth foolproof devices 317a and 317b are the edges of the metal liner 315. When the sidewall of the plate 310 is mated with the edges of the metal liner 315, the fourth foolproof devices will press against the third foolproof devices to form the space to accommodate the article. If the metal liner 315 is not disposed on the plate 310 in the particular orientation, the third fool-
proof devices 312a and 312b will not match with the fourth foolproof devices 317a and 317b, respectively. As a result, the metal liner 315 is not joined with the plate 310 tightly enough to serve the purpose of transporting the article safely.

[0035] FIG. 5A illustrates a container 400 for storing or transporting an article according to a third preferred embodiment of the present invention. The container 400 is a reticle pod that comprising a first cover 402 and a second cover 404, in which the first cover 402 forms an internal space 406 and the second cover 404 that is used to separate the internal space 406 from outside. The second cover 404 comprises a frame 4041 and a door 4042, in which the frame 4041 comprises at least one fifth foolproof device 412 on a portion thereof facing the internal space 406. The container 400 further comprises a metal liner 415 disposed on the second cover 404, wherein the metal liner 415 comprises at least one sixth foolproof device 417. When the sixth foolproof device 417 is mated with the fifth foolproof device 412, the metal liner 415 and the second covered 404 a space to accommodate the article.

[0036] In this embodiment, as shown in FIG. 5B, the fifth foolproof device 412 on the frame 4042 is a protrusion extending into the internal space 406, while the sixth foolproof device 417 is a curved portion of the metal liner 415, wherein a notch formed by the sixth foolproof device 417 is used to accommodate the fifth foolproof device 412. When the fifth foolproof device 412 is not mated with the sixth foolproof device 417, the second cover 404 and the metal liner 415 cannot form the space to accommodate the article, and therefore do not serve the purpose of storing or transporting the article safely. Besides, the fifth foolproof device 412 can serve as a part of a locking devise (not shown) disposed on the second cover 404, which can lock the first cover 402 and the second cover 404.

[0037] In summary, the present invention provides a container and a foolproof device thereof, in which the foolproof device is designed as integrated with an original structure of the container, so as to ensure that components of the container are properly positioned and will not damage the article stored in the container when the container is in use. Furthermore, the foolproof device does not need to be secured with screws, so that tiny particles are prevented from being generated. Moreover, the present invention can minimize the amount of accumulated charges and thereby protect the article from being damaged by static electricity.

[0038] The present invention has been described with preferred embodiments thereof and it is understood that the embodiments are not intended to limit the scope of the present invention. Moreover, as the content disclosed herein should be readily understood and can be implemented by a person skilled in the art, all equivalent changes or modifications which do not depart from the spirit of the present invention are encompassed by the appended claims.

What is claimed is:

1. A container for storing or transporting an article, comprising:
   a first cover, forming an internal space;
   a second cover, for separating the internal space from outside, wherein the second cover comprises at least one first foolproof device; and
   a plate, disposed on a surface of the second cover facing the internal space, and comprising at least one second foolproof device; wherein the plate and the second cover are generally fixedly positioned with respect to each other when the second foolproof device is engaged with the first foolproof device in a particular orientation.

2. The container according to claim 1, wherein the plate and the metal liner are not fixedly positioned with respect to each other when the second foolproof device is not engaged with the first foolproof device.

3. The container according to claim 1, wherein the first foolproof device is at least one recess and the second foolproof device is at least one protrusion corresponding to the recess.

4. The container according to claim 1, wherein the first foolproof device is at least one protrusion and the second foolproof device is at least one recess corresponding to the protrusion.

5. The container according to claim 1, wherein the second cover further comprises a frame and a door.

6. The container according to claim 1, wherein the container is a reticle pod or a single-reticle SMIF pod.

7. The container according to claim 1, further comprising a metal liner.

8. The container according to claim 1, wherein the plate is made of an electrically conductive material.

9. The container as claimed in claim 8, further comprising a metal liner, wherein the metal liner is made of an electrically conductive material and in electrical communication with the plate.

10. A container for storing or transporting an article, comprising:
    a first cover, forming an internal space;
    a second cover, for separating the internal space from outside;
    a plate, disposed on a surface of the second cover facing the internal space, and comprising at least one third foolproof device on a portion thereof facing the internal space; and
    a metal liner, disposed on the plate and comprising a fourth foolproof device;

wherein the plate and the metal liner are generally fixedly positioned, and therefore will not move, with respect to each other when the third foolproof device is engaged with the fourth foolproof device in a particular orientation, so that the plate and the metal liner form a space to accommodate the article.

11. The container according to claim 10, wherein the plate and the metal liner are not fixedly positioned with respect to each other when the third foolproof device is not engaged with the fourth foolproof device.

12. The container according to claim 10, wherein the third foolproof device is at least one sidewall.

13. The container according to claim 12, wherein the sidewall protrudes from the surface of the plate facing the internal space.

14. The container according to claim 12, wherein the sidewall is sunk into the surface of the plate facing the internal space.

15. The container according to claim 12, wherein the fourth foolproof device presses against the sidewall.

16. A container for storing or transporting an article, comprising:
    a first cover, forming an internal space;
    a second cover, for separating the internal space from outside, wherein the second cover comprising at least one fifth foolproof device on a portion thereof facing the internal space; and
a metal liner, disposed on the second cover and comprising at least one sixth foolproof device; wherein the metal liner and the second cover form a space to accommodate the article when the sixth foolproof device is engaged with the fifth foolproof device in a particular orientation.

17. The container according to claim 16, wherein the second cover and the metal liner do not form the space to accommodate the article when the fifth foolproof device is not engaged with the sixth foolproof device.

18. The container according to claim 16, wherein the second cover is provided therein with a locking device for locking the first cover and the second cover.

19. The container according to claim 18, wherein the fifth foolproof device is part of the locking device.

20. The container according to claim 16, wherein the sixth foolproof device is a curved portion of the metal liner.

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